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TRANSMITTAL LETTER
(General - Patent Issued)Docket No.
02410269AA

Patentee(s): Kittaka, et al.

U.S. Patent No.

6,847,770

Issue Date

January 25, 2005

Title: LENS FUNCTION-INCLUDING OPTICAL FIBER AND METHOD OF PRODUCING THE SAME

Certificate

JUL 01 2005

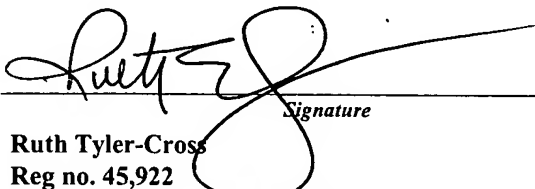
of Correction

COMMISSIONER FOR PATENTS:

Transmitted herewith is:

**REQUEST FOR ISSUANCE OF CERTIFICATE OF CORRECTION; CERTIFICATE OF CORRECTION;
COPIES OF CLAIMS AS FILED PG2-4**

- ☒ No additional fee is required.
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SignatureRuth Tyler-Cross
Reg no. 45,922
Whitham, Curtis & Christofferson, PC
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703-787-9400

Dated: June 29, 2005

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JUL 06 2005



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re United States Patent Number 6,847,770

Date of Issue: January 25, 2005

Inventor: Kittaka et al

Title: ***LENS FUNCTION-INCLUDING OPTICAL FIBER AND METHOD OF PRODUCING THE SAME***

REQUEST FOR ISSUANCE OF CERTIFICATE OF CORRECTION
IN ACCORDANCE WITH 37 C.F.R. §§ 1.322

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant hereby requests the issuance of a certificate of correction for the above-identified patent.

In claims 2 and 11, the numeral "13" was inadvertently inserted after the phrase "a lens function" and should be removed.

Claims 2 and 11 should read as follows:

2. A lens function including optical fiber according to claim 1, wherein said information transmission optical fiber is a single mode optical fiber.

11. A method of producing a lens function including optical fiber, comprising the steps of:

immersing a homogeneous glass rod in molten salt to perform ion exchange to thereby form a refractive-index distribution in said glass rod;

forming a gradient index optical fiber with a desired outer diameter by stretching said glass rod while heating said glass rod retained vertically; and

cutting said gradient index optical fiber into a length corresponding to a specific periodic length of said gradient index optical fiber.

JUL 06 2005

Applicant submits that this correction is necessary in order to place claims 2 and 11 in standard form, and that the error was on the part of the USPTO. Applicant herewith encloses as evidence a copy of the claims as amended in a response filed July 30, 2004 (pages 2-4 of the response), with annotations indicating an Examiner's amendment, a copy of which was mailed from the USPTO to Applicant's representative on October 7, 2004. As can be seen, claims 2 and 11 in their final, allowed form did not contain the numeral "13". Thus, this error was introduced on the part of the Office after allowance. No fee is thus enclosed.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ruth E. Tyler-Cross", with a stylized flourish extending from the end.

Ruth E. Tyler-Cross

Reg. No. 45,922

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LISTING OF CLAIMS

1. (Currently amended) A lens function-including optical fiber comprising:

at least one information transmission optical fiber; and

at least one gradient index optical fiber having an outer diameter equal to that of said information transmission optical fiber and having a length exhibiting a specific lens function, said gradient index optical fiber being jointed or contacted with an end surface of said information transmission optical fiber,

and wherein, when a refractive-index distribution of said gradient index optical fiber in a wavelength range used is given by the expression:

$$n(r)^2 = n_0^2 \cdot \{1 - (g \cdot r)^2 + h_4(g \cdot r)^4 + h_6(g \cdot r)^6 + h_8(g \cdot r)^8 + \dots\},$$

said gradient index optical fiber satisfies a condition:

$$0.1 \leq n_0 \cdot g \cdot r_0 \leq 0.5$$

in which r is a distance from an optical axis, n(r) is a refractive index in a position at the distance r from the optical axis, n₀ is a refractive index on the optical axis, r₀ is a radius of said gradient index optical fiber, g is a refractive-index distribution coefficient, and h₄, h₆, h₈... are high-order refractive-index distribution coefficients respectively.

2. (Original) A lens function-including optical fiber according to claim 1, wherein said information transmission optical fiber is a single mode optical fiber.

3. (Original) A lens function-including optical fiber according to claim 1, wherein said gradient index optical fiber is produced by an ion exchange method.

4. (Cancelled) A lens function-including optical fiber according to claim 1, wherein, when a refractive-index distribution of said gradient index optical fiber in a wavelength range used is given by the expression:

$$n(r)^2 = n_0^2 \cdot \{1 - (g \cdot r)^2 + h_4(g \cdot r)^4 + h_6(g \cdot r)^6 + h_8(g \cdot r)^8 + \dots\},$$

said gradient index optical fiber satisfies a condition:

$$0.1 \leq n_0 \cdot g \cdot r_0 \leq 0.5$$

in which r is a distance from an optical axis, $n(r)$ is a refractive index in a position at the distance r from the optical axis, n_0 is a refractive index on the optical axis, r_0 is a radius of said gradient index optical fiber, g is a refractive-index distribution coefficient, and $h_4, h_6, h_8 \dots$ are high-order refractive-index distribution coefficients respectively.

5. (Original) A lens function-including optical fiber according to claim ~~1~~¹, wherein said gradient index optical fiber satisfies a condition:

$$0.12 \leq n_0 \cdot g \cdot r_0 \leq 0.25.$$

6. (Original) A lens function-including optical fiber according to claim ~~1~~¹, wherein the refractive index n_0 on the optical axis of said gradient index optical fiber is in a range of from 1.40 to 1.80 (both inclusively).

7. (Original) A lens function-including optical fiber according to claim ~~1~~¹, wherein the refractive index n_0 on the optical axis of said gradient index optical fiber is in a range of from 1.50 to 1.70 (both inclusively).

8. (Original) A lens function-including optical fiber according to claim 1, wherein a length of said gradient index optical fiber is in a range of from 0.05P to 1P (both inclusively) in which P is a periodic length of said gradient index optical fiber.

9. (Original) A lens function-including optical fiber according to claim 1, wherein the length of said gradient index optical fiber is in a range of from 0.05P to 0.5P (both inclusively) in which P is the periodic length of said gradient index optical fiber.

10. (Original) A lens function-including optical fiber according to claim 1, wherein said information transmission optical fiber and said gradient index optical fiber are joined and fixed

to each other in a condition that said two optical fibers are inserted in a sleeve having an inner diameter substantially equal to said outer diameter of said two optical fibers.

11. (Currently amended) A lens function-including optical fiber comprising:

at least one information transmission optical fiber; and
at least one gradient index optical fiber having an outer diameter equal to that of said
information transmission optical fiber and having a length exhibiting a specific lens function,
said gradient index optical fiber being jointed or contacted with an end surface of said
information transmission optical fiber.

~~A lens function-including optical fiber according to claim 1,~~

wherein said information transmission optical fiber and said gradient index optical fiber are joined and fixed to each other in a groove which is formed in a planar substrate and which is V-shaped in section.

12. (Original) A method of producing a lens function-including optical fiber, comprising the steps of:

immersing a homogeneous glass rod in molten salt to perform ion exchange to thereby form a refractive-index distribution in said glass rod;

forming a gradient index optical fiber with a desired outer diameter by stretching said glass rod while heating said glass rod retained vertically; and

cutting said gradient index optical fiber into a length corresponding to a specific periodic length of said gradient index optical fiber.

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,847,770
DATED : Jan. 25, 2005
INVENTOR(S) : Kittaka et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 8,

Line 1, replace "A lens function 13 including optical fiber" with --A lens function including optical fiber--

Column 8,

Lines 46-47, replace "A method of producing a lens function 13 including optical fiber" with --A method of producing a lens function including optical fiber--

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PATENT NO. 6,847,770

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